MACHINE DESIGN

1966 ANNUAL INDEX

Volume 38—January to December

Including 26 regular issues of MACHINE DESIGN plus four special issues—*The Bearings Reference Issue, The Plastics Reference Issue, The Fluid Power Reference Issue, and The Electric Controls Reference Issue.* Only articles and editorial items one-half page or larger are indexed.

AUTHOR INDEX

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SUBJECT INDEX

Numbers preceding the column heads refer to the MACHINE DESIGN *Subject Classification System* (January 1964).

Editorial material in this section is classified according to the following system:

1	2	3	4	5
400-cps Motors	Varner	7/8	120	(5.0)

1. Title.
2. Author's last name (see Author Index for complete name). Departments in regular issues are denoted by the following code:
   - Trends .....Trends in Technology or Trends in Design and Development
   - Scan .....Scanning the Field for Ideas
   - DIA .....Design in Action
   - PR .....Picture Report
   - DI .....Design International
3. Date of issue, MACHINE DESIGN *Reference Issues* are denoted by the following code:
   - B .....*Bearings* (March 10)
   - P .....*Plastics* (June 16)
   - FP .....*Fluid Power* (September 22)
   - EC .....*Electric Controls* (December 15)
4. Page Number.
5. Number of pages in article or editorial item.

Electrical and Electronic Drives, Controls and Systems

11. Electric Motors

The Polarized Hysteresis Motor	Medley	8/18	165	(3.0)
Brushless D-C Motors	Yates	3/3	136	(6.5)
New Electric Motor Push-Pulls and/or Rotates a Shaft	Trends	1/20	8	(1.0)
Most Powerful D-C Motor	Trends	6/9	34	(0.5)

12. Power Supplies

Regenerative Fuel Cell Achieves High Efficiency	Trends	1/6	24	(0.5)
Fuel Cell Works after Its Rocket Blows Up	Trends	7/21	14	(0.6)
Tiny Solid-State Battery Produces Meaningful Current	Trends	8/4	35	(0.6)
Thin-Film Solar Cells Are Ready for Space Tests	Trends	8/18	14	(0.6)
Electric Fords in 1977	Trends	10/27	12	(2.3)
Electric Vehicles May Evolve from the Military	Trends	12/8	16	(1.0)
Gated Transformer Cuts Condenser Charge Time	Scan	6/9	139	(0.6)
Piggyback Windings Anticipate Flux Saturation	Scan	9/29	128	(1.0)
Operational Wastes Provide Fuel-Cell Recharge	Scan	11/10	198	(1.0)
Servo-Balanced Transformer Eliminates Phase Loss	Scan	11/24	148	(0.5)
First Radioisotope Generator	PR	10/13	4	(0.5)

13. Switches and Relays

Motor-Starting Relays	Brose	1/6	124	(8.0)
A Dictionary Of Relay Types	(Article)	3/31	131	(20.0)
Relays in Design	(Article)	5/26	169	(17.0)
Solid-State Temperature Controls	Brookmire	7/21	183	(7.0)
Bimetal Elements	Wiedemann	12/8	195	(6.0)
Manual Switches	Ensign and Peterson	EC 12/15	4	(8.0)
Precision Snap-Acting Switches	Schwarzkopf	EC 12/15	15	(6.0)
Limit Switches	Farrow	EC 12/15	21	(5.0)
Mercury Tilt Switches	Skyrms and Hyzer	EC 12/15	26	(4.0)
Pressure Switches	Zurstadt	EC 12/15	30	(6.0)
Temperature Switches	Howard	EC 12/15	36	(4.0)
Proximity Switches	(Article)	EC 12/15	40	(4.0)
Relay Types and Terminology	Campbell	EC 12/15	44	(9.0)
Armature Relays	Foster & Probert	EC 12/15	53	(3.0)
Reed Relays	(Article)	EC 12/15	56	(6.0)
Stepping Switches	Dibbern & James	EC 12/15	62	(3.0)
Circuit Breakers	Schwartz & Taylor	EC 12/15	82	(4.0)
Suspended Ball Indicates Acceleration	Scan	1/20	165	(1.0)
Pushbutton Rocker Prevents 3-Way Switch Override	Scan	2/3	114	(0.5)
Magnetic Detent Marks Acceleration Level	Scan	7/7	129	(0.5)
Gas-Dampened Vibration Senses Pressure	Scan	10/27	166	(5.0)

14. Instruments and Controls

Mechanical and Electric Counters	Kimble	7/7	122	(6.0)
Panel-Meter Faces	Seminara	9/1	133	(5.0)
Temperature Transducers	Hartz	9/15	188	(5.0)
NEMA Industrial-Control Relays	Russo	EC 12/15	65	(5.0)
Timers	(Article)	EC 12/15	70	(6.2)
New Gage Measures Accumulated Fatigue Damage	Trends	1/20	12	(1.0)
"Undetectable" Soldering Faults are Caught by Infrared Inspection	Trends	8/18	33	(0.8)
New Speed Trap Clocks Liquid Hydrogen	Trends	8/18	27	(0.7)
'Production Eye' Recognizes Scribbled Numbers for a Computer	Trends	10/27	10	(0.4)
Cantilevered Coil Increases Pointer Torque	Scan	4/14	186	(0.5)
Photosensitive Sandwich Pinpoints Light Source	Scan	5/12	208	(0.6)
Interlaced Plates Clock Rotational Flutter	Scan	7/7	128	(0.6)
Revolving Sensor Telegraphs Temperature	Scan	7/7	129	(0.5)
Peek-A-Boo Coding Controls Conveyor	Scan	10/13	204	(1.0)
Electronic Switch Gates Breakerless Magneto	Scan	12/8	180	(1.0)
Shuttered Sensors Track Wandering Light	Scan	12/22	129	(0.5)
Filters Check Lamp Color Temperature	DIA	1/6	30	(0.5)
Sensors Control Letter-Sorting Belt Maze	DIA	5/12	46	(1.0)
Mercury Sensors Monitor Sinking Buildings	DIA	9/15	50	(0.5)
Projected Light Patterns Verify Readout Numerals	DIA	11/24	36	(1.0)
Spiraling Scanner Reads Handwritten Letters	DIA	12/22	36	(1.0)
How To Find Life On Mars	PR	11/24	6	(0.5)

15. Circuit Components

Thyristor Semiconductor Components	Gutzwiller	2/3	142	(4.7)
Solid-State A-C Voltage Regulator	Brookmire	10/13	229	(4.0)
Introduction to Semiconductors	(Article)	11/24	129	(9.0)
Industrial Electronics	Tucker	11/24	149	(20.0)
Properties of Semiconductors	(Article)	12/8	174	(6.0)
Switching Transistors	Jalbert	EC 12/15	79	(3.0)
Thyristors	Larson & Marsh	EC 12/15	75	(4.0)
Preparation of Semiconductor Materials	(Article)	12/22	130	(7.0)
Laser Finds a Job on a Mass-Production Line	Trends	1/6	10	(0.5)
Silicon-Nitride Components Called Major Semiconductor Advance	Trends	2/3	24	(1.3)
Sun-Pumped Laser Will Beam Messages from Mars	Trends	2/17	27	(0.6)
Ruby Laser Upsets the Assumptions	Trends	3/3	8	(0.6)
Luminescence Is Efficient from "Difficult" Class of Semiconductors	Trends	3/31	35	(0.7)
Laser Lights the Way for Huge Tunnel Digger	Trends	4/28	14	(0.8)
Laser Pinpoints Distances with "Zero" Error	Trends	5/12	36	(1.0)
Practical Methods of Making Gallium-Arsenide Parts	Trends	6/23	32	(0.5)
Laser Beam Creates a Plasma	Trends	7/21	18	(0.6)
Integrated Circuits Take Over a Numerical Control	Trends	9/1	25	(1.0)
Tripled Efficiency Claimed for Light-Emitting Diodes	Trends	10/13	34	(0.4)
Laser Gyro Aims the Navy's Guns	Trends	10/13	34	(0.6)
Laser Beam Acts Like Electric Arc in Breaking Down Gases	Trends	10/27	24	(0.3)
New Laser Generates Giant Pulses in a Tight Beam	Trends	11/10	32	(0.6)
Integrated Circuits are 'Glued Down' on Glass	Trends	11/10	32	(0.4)
1,500 Percent Growth by '71 Predicted for Integrated Circuits	Trends	12/8	38	(0.5)
Hybrid Integrated Circuits are Slated for Early Extinction	Trends	12/8	38	(0.8)
Improved Methods Boast Transistor Frequencies	Trends	12/8	41	(0.7)
Laser Beam Burns High-Density Data on Tape	Trends	12/22	21	(0.7)
New Seals Boost Reliability of Silicon Devices	Trends	12/22	24	(0.7)
Laser Triggers Large-Power Switch	Trends	12/22	27	(0.7)
Liquid Potentiometer Detects Tilt	Scan	5/26	168	(0.5)
Semiconductor Switches Translate Digital Data to Mechanical Action	DIA	9/15	48	(1.0)

16. Connectors and Wiring

Connector-Oriented Design	Ganzert	4/28	215	(4.0)
Contactors	Russo	EC 12/15	86	(2.0)
Hybrid Integrated Circuits Go into Mechanized Production	Trends	4/28	36	(0.5)
What the Well-Dressed Cable Should Be Wearing	Trends	9/15	26	(1.5)
Tiny Circuit Reacts in 400 Picoseconds	Trends	11/24	25	(0.5)
Braided Connector Flexes Without Loosening	Scan	1/20	154	(0.5)
Capacitance-Pulse Rate Clocks Shaft Speed	Scan	5/26	147	(1.0)
Connector Modules Simplify Printing Press Assembly	DIA	8/18	36	(2.0)

17. General Components

Permanent Magnet Materials	Cochrane	9/15	194	(7.0)
Superconducting Magnets	Montgomery	10/13	234	(4.2)
Microencapsulation	Hanny, Huber & Peters	10/27	196	(2.7)
High-Temperature Electrical Materials	Kueser	11/10	222	(3.2)
31-lb Magnet Doubles 1-Tonner's Field	Trends	2/17	24	(0.5)
Heat Pipe Transfers Thermal Energy for Direct Conversion to DC	Trends	3/17	10	(0.5)
Spacecraft Magnets May Tame Re-entry Plasmas	Trends	4/14	35	(0.5)
Ceramic-Sealed Heaters Keep Coffee Hot	Trends	5/12	24	(0.7)
Magnetic Sleeve Heats Cold Conductor	Scan	1/6	115	(0.5)
Lamps Diagnose Circuit Failure	Scan	5/26	168	(0.5)
Electroluminescent Pattern Forms Digits	Scan	7/7	136	(1.0)
Magnetic Shutters Vent Overpressure	Scan	9/1	132	(0.5)
Magnets Manipulate Conveyor Flow	Scan	9/1	115	(0.5)
Magnetic Flux Reversal Switches Contacts	Scan	10/13	198	(1.0)
Magnetic Field Dissipates Damaging Arc	Scan	10/27	156	(1.0)

19. Systems, Drives, Assemblies

Fluid Drives, Controls and Systems

21, 22. Fluids, Fluid Conditioners

23. Fluid Conductors

24. Linear Devices

25. Rotary Devices

26. Seals, Packings, Gaskets

27. Valves

28. Instruments and Controls

29. Systems and Assemblies

Mechanical Drives, Controls and Systems

31. Engines, Atomic Power, Power Sources

32-34. Drives, Transmissions, Drive Components

35. Rotational Components

36, 37, 39. Mechanisms, Controls, Systems

Determining Minimum Cam Size	Fenton	1/20	155	(4.0)
Joystick Maneuvers, Speeds, and Brakes a Sub	Trends	1/20	10	(0.7)
Apollo Docking Is Simulated with "Air-Bearing Spacecraft"	Trends	8/4	12	(0.6)
"Mohole Anchor" Finds a Job in Industry	Trends	8/18	18	(0.7)
Electrostatic Gyro Coasts for Three Years	Trends	12/22	10	(0.5)
Eccentric Lever Adjusts Precise Cutter	Scan	1/20	166	(0.7)
Skewed Rollers Propel Actuator	Scan	2/3	114	(0.5)
Tapered Cam Controls Feedback	Scan	2/17	162	(0.6)
Rolling Ball Monitors Tilt	Scan	6/23	170	(1.0)
Sandwiched Ring Cuts Seal Rub	Scan	6/23	175	(0.5)
Stepped Fulcrum Lifts Load	Scan	7/7	115	(1.0)
Crossed Cam Slots Convert Linear Motion	Scan	8/18	164	(0.5)
One-Turn Gear Set Simplifies Divider Index	Scan	10/13	178	(0.3)
Linkage Generates Hesitation Output	Scan	12/8	194	(1.0)
Spring-Controlled Drum Peels Backing Tape	DIA	1/20	34	(1.0)
Oscillating Paddle-Wheel Tests Thin-Strip Fatigue Life	DIA	3/3	41	(1.0)
Linkage Prevents Common Typing Goofs	DIA	4/14	50	(2.0)
Rolling Cylinder Reduction System Positions Lens	DIA	7/7	28	(1.0)

Assembly Components

41-43. Fasteners, Springs, Misc.

Fastening Gears	Michalec	1/6	139	(5.0)
Hairspring Design	Raedy	5/12	202	(6.0)
Squeeze-Film Damping	Sommer	5/26	163	(4.8)
Poor Spring Performance	Johnson & Joerres	8/4	132	(7.0)
Fatigue in Bolts	Walker & Meyer	9/15	182	(5.0)
Maximum Bolt Tension	Bazaz	9/29	129	(1.5)
Freedom in Bolted Joints	Dinter	10/27	189	(4.8)
The Future of Fasteners	Sproat	12/22	107	(16.0)
Self-Consuming Shock Absorber May Win LEM-Landing Assignment	Trends	5/12	8	(0.5)
New Process Cuts Cost of Drive Rivets	Trends	7/21	32	(0.7)
Threaded Cap Strengthens Plastic Boss	Scan	3/17	151	(0.6)
Recurrent Images Freeze Vibration Peaks	Scan	5/12	170	(0.5)
Integral Jack Jams Locknut	Scan	6/23	165	(1.0)
Single Bolt Secures Strut Cluster	Scan	6/23	176	(1.0)
Midair Collision Eliminates Forge Shock	Scan	9/15	222	(1.0)
Gimbal Isolates Mirror-Adjust Axes	Scan	11/24	138	(1.0)
Experimental Truck May Triple Freight-Train Speed	DIA	9/1	35	(1.0)
Skiers Need Not Pray for Snow	DIA	11/10	42	(1.0)
Cage-Wheels Prevent Tractor Bog Down	DIA	11/10	46	(0.4)
X-ray System Checks Explosive Bolts	DIA	12/22	41	(0.6)

Materials

51, 52. Ferrous, Nonferrous Metals

Aluminum Castings	(Article)	5/12	191	(3.0)
Investment Casting Metals	Broad	6/23	177	(7.0)
Stainless Steel Welds	Reid	11/10	193	(5.0)
Malleable-Iron Parts	Hunsaker	11/24	170	(4.0)
Boron Filament Winds up in a Rocket	Trends	1/6	12	(0.5)

53. Plastics

The New Plastics	Dreger	1/20	144	(10.0)
Fiberglass-Reinforced Nylon	Metz	2/17	187	(6.0)
ABC's of Plastics	Elliott	4/28	188	(9.0)
Embedding Processes and Materials	Harper	6/9	149	(25.0)
Selecting Plastics	Fox	P 6/16	4	(8.0)
Designing with Plastics	(Chapter)	P 6/16	12	(6.0)
Laminated Plastics	Muller	P 6/16	31	(5.0)
Reinforced and Filled Plastics: Thermosets	Sprang & Davis	P 6/16	36	(2.6)
Thermoplastics	Murphy	P 6/16	38	(4.4)
ABS	Whitney	P 6/16	43	(3.0)
Acetals	Kjellmark	P 6/16	46	(3.0)
Acrylics	Pierson	P 6/16	49	(2.0)
Cellulose Acetate	Black	P 6/16	51	(1.7)
Cellulose Propionate	Black	P 6/16	52	(1.1)
Ethyl Cellulose	Bird	P 6/16	53	(1.9)
Cellulose Acetate Butyrate	Hill	P 6/16	55	(1.3)
Chlorinated Polyether	Hanna	P 6/16	57	(2.0)
Ethylene-Vinyl Acetate	Pilaro	P 6/16	59	(1.0)
TFE-FEP Fluorocarbons	Lovell	P 6/16	60	(5.0)
CTFE Fluorocarbons	Bringer	P 6/16	65	(2.0)
Ionomers	Kinsey	P 6/16	67	(1.0)
Nylons	Carswell	P 6/16	68	(4.0)
Parylenes	Gorman	P 6/16	72	(1.0)
Phenoxies	Henriques	P 6/16	73	(1.0)
Polyallomers	Vermillion	P 6/16	74	(1.0)
Polycarbonates	Kunze	P 6/16	75	(2.0)
Polyethylenes	Estes	P 6/16	77	(4.0)
Polyimides	Todd	P 6/16	81	(3.0)
Polyphenylene Oxides	Shenian	P 6/16	84	(2.0)
Polypropylenes	Jones	P 6/16	86	(3.0)
Polystyrenes	Otting	P 6/16	89	(4.0)
Polysulfones	Walton	P 6/16	93	(2.0)
Vinyls	Bulkley	P 6/16	95	(5.0)
Alkyds	Beers	P 6/16	100	(2.0)
Allylics	Beacham	P 6/16	102	(2.0)
Aminos	Sunderland	P 6/16	104	(3.0)
Epoxies	Reese	P 6/16	107	(2.0)
Phenolics	Bainbridge	P 6/16	109	(3.0)
Polyesters	Thornton	P 6/16	112	(3.0)
Silicones	Kin	P 6/16	115	(2.0)
Urethanes	Backus	P 6/16	117	(3.0)
TFE-Lubricated Thermoplastics	Lomax & O'Rourke	6/23	158	(7.0)
Synthetic Materials	Rondeau	7/21	154	(10.0)
Molecular Orientation in Plastic Parts	Paulson	10/13	190	(8.0)
Whisker-Reinforced Plastics	Wohrer, Frechette, & Economy	12/22	138	(2.3)
Plastic Gas Tanks May Soon Appear in Cars	Trends	2/17	30	(0.5)
Photosensitive Plastic Makes Precision Tachometer Disc	Trends	5/12	26	(0.5)
Fiberglas Earns Its Dolphins	Trends	6/23	8	(1.0)
Nylon Eliminates Springs in Indicator Switch	Trends	6/23	26	(0.7)
Smooth Road Ahead for Plastic Gas Tanks	Trends	7/7	24	(0.7)
"Off-the-Shelf" Fiberglas Yacht Wins Racing Crown	Trends	9/1	12	(0.6)
Reinforced Plastics to Keep Subway on Course	Trends	9/1	19	(0.5)
New Amide-Imide Plastics Stay Strong at 600 F	Trends	10/27	32	(0.6)

54-56. Elastomers, Joining Materials, Others

Structural Adhesives and Composite Materials	Roseland	3/17	189	(3.2)
Fiber-Glass Fabrics	Horton	3/31	152	(2.8)
Thermoplastic Elastomers	Luftglass	4/14	194	(4.1)
Sodium Looks Promising as a Practical Conductor	Trends	1/6	24	(0.5)
Foam and Rubber Team Up to Reduce Auto-Race Fire Hazards	Trends	4/28	10	(0.6)
Anaerobic Adhesives Go Structural	Trends	6/9	23	(0.6)
Graphite Proves Effective as a "Laser Saver"	Trends	7/7	26	(0.5)
Scratched-Glass "Pressure Hull' Survives Deep Submergence	Trends	7/21	21	(0.6)

57. Finishes, Coatings, Lubricants

Oils and Greases	Dunham	B 3/10	4	(4.5)
Solid and Bonded-Film Lubricants	DiSapio	B 3/10	8	(3.5)
Decoration and Surface Finish	Scharnberg	P 6/16	28	(3.0)
Heavy-Metal-Derivative Solid Lubricants	Magie	12/8	203	(3.8)
New "Grease" Meters Lube Oil to Sleeve Bearings	Trends	3/3	24	(0.5)
New Finish Adds Life to Aluminum Electrical Parts	Trends	3/3	28	(0.6)

58. Prefabricated Forms

Tubing For Mating Parts	Fling	2/3	111	(4.0)
Perforated Metals	Siebert	3/17	152	(7.0)
Milled Contour Strip	Hood	5/26	187	(3.0)
Ceramic-Metal Composites	Smith	9/15	201	(5.0)
Compensating Bimetal Elements	Wiedemann	12/22	123	(3.0)
Evaporated Film Promises Better Photos	Trends	2/3	12	(0.5)
Wind-Out Columns Gain Favor as Space Antennas and Supports	Trends	7/7	14	(0.5)
Bricked-up Pressure Hull Survives Deep Submergence	Trends	9/1	8	(1.0)
Rigid Solar Mirror is 'Shaved Thin' Out of 1-in. Magnesium	Trends	9/15	12	(0.8)
Man Bites Dog—Steel Replaces Plastic	Trends	9/15	22	(0.7)
Coating Stops Tape Breakage in Short-Landing System	Trends	12/22	14	(0.4)
Corrugated Sheets Form Compound Curves	Scan	1/20	164	(0.5)
Capacitive Tape Senses Tank Leaks	Scan	5/12	170	(0.5)
Wetted Tapes Form Ribbon Battery	Scan	6/9	148	(0.5)
Multiple Nets Snare Runaway Aircraft	DIA	5/26	42	(1.0)
Collapsible Tube to Make Rigid Spacecraft Boom	DIA	7/21	50	(1.0)

Manufacturing Methods and Processes

61-63. Metals Casting, Shaping, Forming

Steel Castings	Briggs	3/31	123	(3.0)
Filament-Wound Parts	Garritano	4/14	166	(7.0)
Explosive Forming	Rassmussen	4/28	254	(2.3)
Aluminum Castings	(Article)	5/12	191	(3.0)
Properties of Powder-Metal Parts	Feir	6/9	178	(3.2)
Aluminum Impact Extrusions	Hall	8/4	140	(5.0)
Magnetomotive Forming Developments and Magnetohydraulic Forming	Schwinghamer	9/29	151	(0.7)
Castings With Inserts	Seal	10/27	157	(5.0)
Low-Cost Core Produces Die-Cast Threads	Trends	1/20	22	(0.6)
Cold-Forming Produces Wide Range of Gears	Trends	3/17	22	(0.7)
New Process Casts Single-Crystal Parts	Trends	3/31	32	(0.5)
Die Casting of Ferrous Metals Approaches Commercial Reality	Trends	6/9	26	(0.8)
High-Density Diecastings Made by New Process	Trends	8/4	29	(0.5)
High-Density Diecastings Now Ready for the Tough Jobs	Trends	9/15	25	(1.0)
Cast-Weld Method Produces 35-Ton Pump Casings	Trends	10/13	28	(0.5)
Powered Knuckles Squeeze Metal Gloves	Scan	11/24	169	(1.0)
Rocking Dies Reduce Billet Size	DIA	11/10	40	(1.0)
Electron-Beam Welder Works Well in Space	Trends	10/13	12	(0.5)
Drop Smasher Quenches Metals at 1,000,000 Deg per Sec.	Trends	11/10	25	(1.0)
Tig-Quality Welds Made At Mig Speeds	Trends	11/10	29	(0.4)
Zippered Seam Strengthens Extendible Boom	Scan	3/17	163	(0.5)
Friction Weld Bonds Packing Case Bands	DIA	7/21	48	(1.0)
Tiny Sand Blaster Cleans or Cuts Precision Parts	DIA	11/10	43	(1.0)
Ram-Mounted Tool Grinds out Die-Making Electrodes	DIA	11/24	39	(1.0)

64-66. Metals Joining, Removal, Treating

Dip-Brazed Aluminum Assemblies	Krebs	8/18	158	(6.0)
Assembling with Adhesives	Sharpe	8/18	178	(23.0)

67-69. Metals Finishing, Plastics Processes

Embedding Processes and Materials	Harper	6/9	149	(25.0)
Forming and Fabricating Plastics	Carlyon	P 6/16	18	(4.0)
Plastics Assembly Methods	(Chapter)	P 6/16	22	(6.0)
The Staggering Scrap Spectacle	Barnes	7/7	116	(6.0)
Bias-Sputtered Thin Films	Seeman	9/15	225	(3.7)
Technology in Turmoil: Producing the Impossible	Khol	9/29	131	(20.0)
Flame Spraying	Dennison	12/8	168	(5.0)
Process Promises Durable Plating on Aluminum	Trends	1/6	20	(0.7)
Shake-and-Spin Technique Fills Stator Voids with Insulation	Trends	8/4	32	(0.7)
Two More Plastics Join 'The Platables'	Trends	12/8	28	(1.0)
Black Chrome Plate Absorbs up to 97% Light	Trends	12/22	18	(0.7)
Card-Programmed Plating System Uses Leap-Frog Conveyor	DIA	10/27	40	(2.0)

Design Theory and Techniques

71, 72. Mechanics, Strength of Materials

Fatigue Stresses from Complex Loadings	Little	1/6	145	(5.0)
Strength of Screws and Tapped Holes	Lipari	1/20	167	(3.7)
Vibration Reduction Techniques	Baumann	1/20	172	(4.1)
Materials That Creep	Alexander	3/3	120	(8.0)
Factor Of Safety	Little	7/21	165	(6.0)
Noise Measurement Methods	Ranz	11/10	199	(7.7)
Center of Gravity by Photography	Nachlupins	11/24	145	(3.0)
The True Design Strength of Materials and Joints	Smith	12/8	181	(8.4)
Exploding Foil Tips Off Nuclear-Shock Secrets	Trends	6/23	14	(1.0)
Truck-Crash Survey Shows the Driver is Too Often Mangled	Trends	10/13	14	(0.5)
Magnetic Fields Support Wind-Tunnel Model	DIA	1/6	30	(0.5)
Fail-Safe Design	DIA	2/17	38	(4.0)
Gun Blast Opens Pilot's Parachute	DIA	4/14	54	(1.0)

74. Human Factors Engineering

The Disposal Gap	Barnes	3/17	144	(7.0)
Packaging a Delicate Payload	Wise	6/9	120	(6.0)
New Deep-Diving Hardware	Barnes	8/4	124	(8.0)
Relieving Acoustic Fatigue	Tolhurst	8/4	168	(3.6)
"Living" Manikin Will Let Young Physicians Practice	Trends	1/20	14	(0.7)
Train in a Tunnel Is Like a Plane in a Dive	Trends	2/3	8	(0.5)
Reasons Are Cited for the Auto-Exhaust Rebellion	Trends	2/3	16	(0.5)
Bring Back the Electric Auto	Trends	5/26	22	(0.5)
LEM Life-Support System Is Ready for the Moon Flight	Trends	7/7	14	(0.8)
Bolted-on Armor Protects Chinook Crews and Equipment	Trends	7/7	16	(1.0)
FAA Suggests Revising Aircraft Safety Rules	Trends	9/1	14	(0.6)
Bagging a Spaceman	Trends	9/29	10	(0.5)
Helicopter Escape System Proves Feasible	Trends	10/13	8	(0.7)

75. Design Analysis and Synthesis

Network Planning Techniques	Magnus	1/6	102	(9.0)
Watt's Linkage Analysis	Amort	2/3	115	(1.0)
Natural Frequencies of Cantilever Bars	Weindling	2/3	137	(3.4)
Calculating Link Lengths	Li	2/17	193	(2.0)
Natural Frequencies	Hassoun	3/3	143	(2.0)
Man-Computer Graphic Communication	Chasen	3/3	145	(2.8)
Statistical Jargon	Ahlbeck	3/17	159	(4.0)
Unsymmetrically Loaded Beam Deflections	Cuppan	3/17	183	(3.5)
Determining Linkage Proportions	Timko	3/31	127	(3.8)
Thin-Plate Natural Frequencies	Vet	6/9	175	(3.0)
Gear Train Accuracy: Part 3—Total Gear-Train Position Error	Michalec	7/7	130	(5.8)
Slow-Speed, Roller-Chain Drives	Reibel	8/4	159	(3.0)
Time-Sharing of Computers	Lavoie	8/18	140	(8.0)
How to Talk to a Computer	Wasserstrom	10/27	140	(6.0)
The Odds against Fracture, or Predicting Strength of Brittle Structures	Barnett, Costello & Herman	11/10	184	(7.6)
Industry Sponsors Graphic Symbols for Fluidics	Trends	4/14	29	(2.0)
Make-Believe Boat Proves Its Hydrofoils Stable	Trends	5/26	14	(0.7)
Prepackaged Programs Reduce Math Leg-Work	Trends	5/26	24	(0.5)
Lockheed Talks Over Its SST Design	Trends	7/21	10	(1.6)
Models Simulate 'Fantastic Voyage' Inside Molten Metals as They Cool	Trends	11/24	22	(0.7)

76. Basic Sciences

The Search for Extraterrestrial Life	Wise	7/21	148	(6.0)
Superconductive Devices	Flynn	8/18	202	(5.0)
Cryosurgery	Barron	10/13	184	(6.0)
Cryobiology	Barron	10/27	150	(6.0)
Optical Choppers	Cade	10/27	167	(4.0)
Fiber Optics Replace Lens in New Oscilloscope	Trends	10/27	21	(0.4)
Cannon-Fired Ground Wire Might Turn off a Tornado	Trends	11/10	10	(1.0)
Trapped Light Traces Liquid Level	Scan	7/21	164	(1.0)
Hole-less Mask Crops Optical Field	Scan	8/18	164	(0.5)
Prism Array Forms Movement Multiplier	Scan	12/8	190	(1.0)
No-Blur Film Editor Relies on Precision Casting	DIA	9/29	35	(1.0)
Pollution Clean Up	DI	10/27	48	(0.3)
Open-Heart Surgery Patient "Breathes" with Membrane-Drum Lung	DIA	12/22	32	(1.0)

77. Experimental, Advanced Design

The Plight of Fundamental Research	Raudsepp	8/18	149	(3.0)
Automakers Shun Road and Track for Design/Durability Testing	Wise	8/18	152	(6.0)
Stand-ins for Product Testing	Reinert	9/1	116	(5.5)
Industry, Government, & the Engineer... Part 3: Coping with Government Contracts	Raudsepp	10/13	179	(5.0)
Fastest Gun in a Wind Tunnel Creates Back-from-the-Planets Speeds	Trends	8/18	10	(0.7)
Iron Bird 'Flies' Boeing 737 Control Systems	Trends	11/24	8	(1.0)
'Sports Tractor' Tows Predictable VTOL Prop	Trends	12/22	10	(0.5)
Emergency Procedures	PR	12/8	4	(0.7)

78. Environmental Design

Designing for Extreme Environments	Kee	2/17	196	(4.6)
Immaculate Voyager Will Visit Mars	(Article)	3/3	106	(6.0)
Human Factors Shape MOLAB	Seminara	5/26	148	(6.0)
New Deep-Diving Hardware	Barnes	8/4	124	(8.0)
Stopping Metal Corrosion	Suss	10/13	199	(5.0)
Humanizing a Moon Rover	Seminara	11/24	124	(5.0)
Newly Christened, Deepstar-4000 Prepares for Chartered Dives	Trends	1/6	8	(1.0)
New Hardware is Needed for Harvesting the Sea	Trends	1/6	10	(0.5)
Apollo Backpack Sustains Trotter Three Hours	Trends	1/6	14	(0.8)
Study Groups Urge Ten-Year Lunar Exploration	Trends	2/3	14	(0.5)
Recovery Systems Are Ready for the Returning Moon Craft	Trends	2/3	14	(0.5)
State-of-the-Art Rescue Rocket Could Double as Service Craft	Trends	2/17	8	(0.5)
Seven Experiments Are Chosen To Be Left Behind on the Moon	Trends	2/17	16	(0.6)
Reusable Spacecraft Would Accelerate Slowly	Trends	3/17	10	(0.5)
Two Volunteers Try 21 Days in a Moon Rover	Trends	3/17	12	(0.6)
Follow the Bouncing Doughnuts	Trends	3/31	10	(0.7)
Life Support Know-How Is Put to the Test	Trends	3/31	14	(0.7)
"Apollo Classrooms" Are Ready To Test Spacecraft and Crews	Trends	3/31	16	(0.6)
Scuba Researchers Dive 400 ft in a Landlocked Lab	Trends	4/14	14	(1.3)
Post-Apollo Project Evaluates Lunar Hardware, Catalogs State of the Art	Trends	4/14	16	(0.7)
"Open-Minded" Spacecraft Reports, Then Earth Designs the Next Test	Trends	4/28	12	(1.0)
Balsa Geometry Is Called Critical for the Mars-Impact Capsule	Trends	4/28	18	(0.7)
Picture Snapping on Mars Will Expose Film on Earth	Trends	5/12	12	(0.6)
"Iron Pants" Protect Against Backpack Exhaust	Trends	6/23	10	(0.7)
First Manned Glass Submarine Will Flash Orders via Light Beams	Trends	8/4	10	(1.0)
Titanium Pressure Vessels Try Buoying a Deep Diver	Trends	9/15	16	(0.5)
Parachuting Capsule 'Lands on Mars' in Earth's Upper Atmosphere	Trends	9/29	14	(0.7)
Stand-Ins Don Space Garb for Endurance-in-a-Vacuum Checks	Trends	10/13	10	(0.6)
Spacecraft Testers Take a New Look at the Sun	Trends	10/13	16	(1.0)
Future Surveyors Will Park before Blasting for the Moon	Trends	10/27	8	(0.6)
'Real Ocean' Is Created in Tiny Tank	Trends	11/10	16	(0.5)
'Tinker Toy' Space Station May Be Grown out of Old Freighters	Trends	12/22	8	(1.0)
Astronauts Train in Computer-Controlled Universe	DIA	8/4	42	(2.0)
Instrumented Raft Rules the Waves	DIA	8/18	40	(1.0)
Earth Model	PR	11/10	4	(0.4)

Engineering Management, Personal

81. Engineering Department Operations

Engineering Supervision: Part 3—Improving the Supervisory-Management Position	Raudsepp	1/6	111	(4.0)
Appraising Managerial Talent	Raudsepp	2/3	93	(8.0)
Continuing Education for the Engineer	Gilmore	2/17	154	(2.0)
Engineers Predict Problems of the '70s	Raudsepp	3/3	102	(4.0)
Technology in Ten Years	Raudsepp	3/17	138	(4.0)
Keeping Up with Knowledge	Raudsepp	3/31	96	(4.0)
Selling Ideas to Management: Part 1—Preparing for the Premiere	Raudsepp	4/28	173	(4.0)
Part 2—On Stage		5/12	156	(5.5)
Getting Results through People	Berra	5/12	218	(2.8)
Soft-Sell Recruiting	Raudsepp	6/9	116	(4.0)
Recruitment Ads That Engineers Read	Raudsepp	7/7	110	(5 0)
Top Technical Talent	Marvin	8/4	120	(4.0)
Effective Engineer Teams	Raudsepp	9/1	100	(4.0)
Industry, Government and the Engineer: Part 1—Why Work for the Government	Raudsepp	9/15	169	(4.0)
Part 2—Doing Business with the Government		9/29	103	(4.0)
Reducing Technical Turnover	Berenson	9/15	162	(7.0)
Persuasive Communication	Lopata	9/29	100	(3.0)
Industry, Government and the Engineer: Part 3—Coping with Government Contracts	Raudsepp	10/13	179	(5.0)
Interviewing Engineers: A Lesson in Diplomacy	Charkey	11/10	166	(4.0)
Engineers Okay Overtime	Charkey	11/10	170	(6.0)
A New Look at Cooperative Education	Greenwald	11/24	118	(3.0)
Effective Engineering Budgets	Myers	12/8	152	(4.0)
Management Clinic	Desi	12/8	156	(3.0)
Engineers Appraise Their Working Atmosphere	Barnes	12/22	92	(6.0)
1965 Graduates Choose Higher Education over High Pay	Trends	1/6	16	(0.7)
Salary Increases Are Measured in Dollars and Percentages	Trends	2/3	18	(0.7)
Recovery from Layoffs—Boeing and Boston	Trends	3/3	19	(0.7)
Effects of Technology on Economy Are Reported	Trends	4/28	24	(0.5)
Engineers Are Harder To Hire This Year	Trends	6/23	22	(0.8)
Technician's Salary Can Exceed $13,000 per Year	Trends	8/18	21	(0.7)
Evolution in Engineering Education	Trends	9/1	16	(1.0)
'Second Sources' of Engineering Talent Can Prevent Technological Under-Achievement	Trends	10/27	19	(1.0)
High Demand for Engineers Promises To Continue	Trends	11/10	19	(0.7)
Engineers Should Be Educated for Leadership	Trends	11/24	16	(0.9)
Managers Charged with Youth Career Guidance	Trends	12/8	25	(0.8)
Engineer Index Goes Up Again	Trends	12/22	16	(0.7)

82-84. New Products, Drafting, Testing

A Case for Coexistence	Roden	2/17	148	(6.0)
Advise and Consent Function in Design	Kupetzky	5/26	138	(4.0)
Boundary Concept of Position Tolerance	Liggett	10/13	174	(4.7)
Marketing Men vs. Design Engineers	Putnam	12/22	98	(2.0)
Design Automation Available Off-the-Shelf	Trends	1/6	26	(0.7)
Lens Zooms In at Mach-4 While Testing Missile Homing Device	Trends	5/26	16	(0.8)
Best Power-Steering Ratio Is Sought on Instrumented Course	Trends	7/21	8	(1.0)
Pencil Records Position As It Traces Lines	Trends	7/21	28	(0.5)
New Drawing Standard Introduces Six New Symbols	Trends	10/13	22	(0.3)
Noise Generator Simulates Rocket Blast	DIA	3/17	43	(1.0)
No Plumbing Needed for Table-Top Dark Room	DIA	10/27	35	(1.0)

85. Technical Information

Identification of Parts and Drawings	Simonton	1/20	159	(5.0)
A Defense of Knowledge	Gallagher	3/17	142	(2.0)
File Now—Find Later	Burgess	4/28	176	(5.0)
Field Failure Reports	Zawacki	6/23	136	(5.0)
What's Wrong With IR?	Berul & Sayer	7/7	106	(4.0)

Parts Identification Systems	Pohs	7/21	142	(6.0)
Information Systems	Liston	7/21	190	(4.0)
The Art of Active Listening	Olson	9/1	104	(2.0)
Graphic Symbols	Long	FP 9/22	4	(3.0)
USASI Heads Standards Team; Federal Charter Next	Trends	10/13	19	(1.7)
Pneumatics Manufacturers Strive for Standardization	DI	10/13	40	(0.3)

86, 87. Patents, Personal, Professional

Registration, Reciprocity, and the Nomadic Engineer	Constance	1/20	135	(3.0)
Personal Outlook	Raudsepp	4/14	157	(2.0)
Creativity and the Critical Attitude	Raudsepp	5/26	142	(5.0)
Our Ailing Patent System	Thomas	6/23	141	(3.0)
Industry, Government and the Engineer: Part 4—Attitudes on Ethics	Raudsepp	10/27	146	(4.0)
Teamwork Stiffles Creativity	Raudsepp	11/24	121	(3.0)
Personal and Career Development	Huse	11/24	176	(2.3)
Engineer's First Degree Should Be Master's	Trends	3/17	19	(0.8)
Design Conference '66 Looks to the Future	Trends	4/14	26	(1.0)
Survey Reveals Management Attitudes toward Inventor Royalties	Trends	6/9	20	(1.0)
Changes Proposed for International Patents	Trends	7/7	20	(0.8)
NSPE Delegates Approve New Membership Criteria	Trends	9/29	16	(0.7)

Specific Machines and Equipment

911. Ordnance

Anti-Missile Missile	(Article)	1/6	116	(4.0)
Breakthrough in Small Arms	Barnes	1/6	120	(4.0)
Mock War Machines	(Article)	4/14	160	(6.0)
Supercold Rocket Passes Hot Start and Restart Tests	Trends	2/17	8	(0.5)
A Gemini First: Splashdown in Pacific	Trends	3/31	12	(1.0)
Ten-Nike "Bowstring" Launches Mach-2 "Arrowhead" Sled	Trends	8/4	8	(0.8)
Cannon Launcher Cuts Rocket Weight by 10:1	Trends	9/15	10	(0.6)
007-Style Shotgun Built for Rough Handling	DIA	1/6	32	(1.0)
Dual-Position Hammer Adjusts Gas Gun's Hitting Power	DIA	1/20	44	(2.0)
Interchangeable Parts Make Six-in-One Weapons System	DIA	3/31	46	(2.0)
Rifle Redesign Benefits from Combat Experience	DIA	5/12	40	(2.0)
T-Bolt Rifle Revives Straight-Pull Action	DIA	9/15	42	(2.0)
Missile Quartet	DI	10/27	45	(0.3)

912. Machinery

The Great Garbage Explosion	Barnes	2/3	100	(10.0)
Machines That Walk	Barnes	2/17	156	(6.0)
The Staggering Scrap Spectacle	Barnes	7/7	116	(6.0)
Master and Slave See the Same Scene Even While Both Turn Their Heads	Trends	3/17	14	(0.7)
Nuts Move through Tapping Machine in Continuous Flow	Trends	7/7	29	(1.0)
'Tractor of Tomorrow' Tests Farmer's Reactions	Trends	9/15	16	(0.5)
Tiny Turbine Turns Trees into Toothpicks	Trends	11/24	10	(0.4)
Crossed Chutes Mix Materials	Scan	3/3	118	(1.0)
Starwheels Control Feeder Traffic	Scan	5/12	216	(1.0)
Suspended Pivots Rotate Zero-Torque Sling	Scan	8/18	168	(1.0)
Regulated Roller Coaster Avoids Foamy Fill	Scan	10/27	188	(1.0)
Orbiting Pins Store Process Memory	Scan	12/8	173	(1.0)
Contactless Communication System Links Crane Cab to Shop Floor	DIA	1/6	35	(0.5)
Alligator Shear Snips Contaminated Pipe	DIA	1/6	35	(0.5)
Tractor-Mounted Spade Eases Tree-Moving Chore	DIA	2/3	32	(1.0)
Hot Ride on Vacuum Cart Speeds Color-TV Tube Production	DIA	2/3	35	(1.0)
Rug Pattern Sprouts from Air-Jet Needles	DIA	2/17	44	(1.0)
Probe-Triggered Blade Whacks Out Unwanted Plants	DIA	4/14	58	(1.0)
Pole Planter Slips through Garden Gate	DIA	4/28	48	(2.0)
Double-Jointed Loader Maneuvers in Tight Quarters	DIA	4/28	54	(1.0)
Padded Conveyor Keeps Fruit Bruise-Free	DIA	4/28	58	(0.6)
Floating Bed Loads Heavy-Duty Chains	DIA	6/23	46	(2.0)
Detachable Claw Recovers Missing Torpedoes	DIA	7/7	30	(1.0)
Wave Monitor Synchronizes Dangling Cargo and Heaving Ship	DIA	9/1	32	(1.0)
Drive-In Restaurant Features Computerized Cuisine	DIA	10/13	46	(2.0)
Tractor Attachment Really Digs Vegetables	DIA	10/13	52	(1.0)
Twin Swivelling Tongs Bind Big Wire Coils	DIA	10/27	38	(1.0)
King-Size Hydraulic Crane	DI	10/27	44	(0.3)
Concrete Contour Constructor	DI	12/22	31	(0.4)

913. Electrical Machinery

Diagnosis By Dynamometer	Kemmerer	6/23	144	(6.0)
Revised Air-Conditioning Cycle Improves Cooling and Heating	Trends	1/20	26	(1.0)
Alpha and Bravo Carry Orders to Spacecraft	Trends	1/20	32	(0.7)
Partial Success Reported on Radar for the Railways	Trends	3/3	10	(0.7)
Rugged Tape Recorder Thrives on Abuse	Trends	3/31	38	(0.5)
Electronic Nerves Recognize 99 Percent of the Sounds	Trends	4/28	18	(0.6)
Satellite Inflates, Then Loses Its Skin	Trends	5/12	8	(0.5)
"Talking Machine" Telephones Pictures Coast to Coast	Trends	5/26	12	(1.0)
Mohole Boss Tells the Navy How to Go Deep	Trends	5/26	14	(0.6)
Crystals Focus Light Beam on 131,072 Points	Trends	6/9	34	(0.5)
High-Speed System Transmits Graphs and Charts	Trends	6/23	24	(0.6)
Add-a-Unit System Would Build Efficient Highway Communications	Trends	8/4	14	(1.3)
Rocket's Radar Eyes Map Terrain 102 Miles below	Trends	8/4	16	(0.7)
Infantry's Radar Tracks Multiple Targets in Both Azimuth and Range	Trends	8/18	8	(1.0)
Barber-Pole Projector Aids Clear-Weather Landings	DIA	1/6	28	(2.0)
Decision Cells Simplify Weather-Satellite Data	DIA	1/20	48	(1.0)
Tape Plays On Despite Rugged Ride	DIA	2/3	30	(2.0)
Flame Power Boosts Loudspeaker Output	DIA	2/3	38	(1.0)
Pickup Bias Prolongs LP Life	DIA	3/31	44	(1.0)
Instant-Change Traffic Signs Check Autobahn Congestion	DIA	4/28	56	(1.0)
Kid-Powered Record Tells the Story	DIA	6/9	42	(1.0)
Record Player Lets Owner Carry a Tune	DIA	8/4	44	(1.0)
Video Tape Travels Helical Path To Get the Picture	DIA	12/8	50	(1.0)
Mobile Interception Radar	DI	12/8	59	(0.4)

914. Transportation

Snow Vehicles	(Article)	1/20	139	(6.0)
The Great Garbage Explosion	Barnes	2/3	100	(10.0)
Mass Transit Begins To Move	(Article)	3/31	100	(6.0)
Ford Ahead on Road to LeMans	Wise	4/28	182	(6.0)
Hot Twins & Compact Jets	Wise	9/1	106	(9.0)
'67 Cars	(Article)	9/15	173	(9.0)
'67 Cars	Wise	9/29	108	(10.0)
Grand Prix Design for the Formula	Wise	11/10	176	(8.0)
Merry Christmas, Chief	Kemmerer	12/8	164	(4.0)
SST: Swing Wing or Delta	Wise	12/22	100	(7.0)
Supersonic Transport Starts into the Mockup Stage	Trends	2/17	14	(0.6)
Idea Car Takes the Wraps off Nearly Ready Gadgets	Trends	3/3	14	(1.0)
Real-Road Data Shake Up the Cadillacs	Trends	3/3	16	(0.6)
DC-10 Candidate Would Carry 550 Passengers	Trends	3/17	8	(0.7)
Starfighter Makes a No-Runway Takeoff	Trends	4/14	8	(0.7)
Three Bombs Are Carried in Space Designed for Two	Trends	4/28	20	(0.7)
Air Mattress Protects Saturn from Technicians' Feet and Butterfingers	Trends	5/12	16	(0.5)
Air Force Plans a Look at Lifting-Body Vehicles	Trends	5/26	8	(0.9)
Supply 'Chute Takes Orders from the Ground	Trends	5/26	10	(0.7)
"Wrist Twist" Steering Clears First Public-Acceptance Hurdle	Trends	6/9	8	(1.0)
Hinged Ship Promises Efficient Use of Locks	Trends	6/9	10	(0.5)
New Tests Are Needed for Rapid SST Development	Trends	6/9	10	(0.5)
Scaled-Up Air-Cushion Vehicle Will Carry a Double Load	Trends	6/9	12	(1.0)
Two Deep Divers Slide down the Ways	Trends	6/9	14	(1.3)
Lunar Walker Tries Toting Crippled Tots	Trends	6/9	16	(1.4)
Monorail Drops an Elevator to Pick Up Passengers	Trends	6/23	12	(0.6)
Silent Sub Will Drift up the East Coast	Trends	7/7	8	(1.0)
SST Nears Point of No Return	Trends	7/7	10	(2.0)
"Private Rapid" Carries Each Commuter from House to Office	Trends	8/18	12	(1.0)
Best Reentry Method: Riding a Helicopter down from Orbit?	Trends	9/15	8	(1.0)

915. Instruments

916. Fabricated Metal Products